From: Howard, Leslie Ann CIV USN BRAC PMO SAN CA (USA) [leslie.howard@navy.mil]
Sent: Monday, February 8, 2021 7:32 AM
To: Pauly, Brooks CIV USN BRAC PMO SAN CA (USA) [brooks.pauly@navy.mil]
CC: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil]
Subject: FW: HPNS Parcel E-2 Phase II CQA Summary Report
Attachments: ID_CQASR_Text-Figures.pdf

FYI – here is the report I mentioned in my previous email…Hamid and Doug have it for review.

Leslie

Leslie A. Howard
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From: Peter Loveridge <peter.loveridge@errg.com>
Sent: Thursday, February 4, 2021 1:32 PM
To: Howard, Leslie Ann CIV USN BRAC PMO SAN CA (USA) <leslie.howard@navy.mil>
Cc: Dennis Kelly <dennis.kelly@errg.com>
Subject: [Non-DoD Source] HPNS Parcel E-2 Phase II CQA Summary Report

Hi Leslie,

Attached is the draft for the CQA Summary Report for Phase II of the Parcel E-2 Remedial Action for your review.

The Report is tied heavily to Aptim's RACR (now RACSR) which is still in draft form, so it will need to be updated as we get to a final version of that report. The Current version of this report is tied to the Redline version of the RACR sent last year.

Attached are the text and figures for the report. Appendix A of the report, which contains all of our individual CQA reports is very large, even broke up into 4 pieces, so may need you to request it from me through your safeapps, since we had issues using SendThisFile last time.

Please let me know if you have any questions.

Thank you,

Peter Loveridge, P.E. | ERRG
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Naval Facilities Engineering Systems Command
Southwest
BRAC PMO West, San Diego, CA

Internal Draft
Construction Quality Assurance Phase II
Summary Report Parcel E-2

Hunters Point Naval Shipyard, San Francisco, California

February 2021

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February 2021

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Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:

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Contract Number: N62473-17-C-4804

Internal Draft
Construction Quality Assurance Phase II Summary Report, Phase II
Parcel E-2
Hunters Point Naval Shipyard
San Francisco, California

Submitted by:
Engineering/Remediation Resources Group, Inc.

	February 4, 2021
Signature	Date
Peter Loveridge, PE	Senior Project Engineer
Name	Title

CERTIFICATION

I hereby certify that this Construction Quality Assurance Report has been prepared in accordance with good engineering practices.

Peter D. Loveridge, P.E.
Civil Engineer No. C52519

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Acronyms and Abbreviations

ARAR ..... applicable or relevant and appropriate requirement

CQA ..... construction quality assurance

CQAP ..... construction quality assurance plan

CQC ..... construction quality control

CSO ..... Caretaker Site Office

cy ..... cubic yard

DBR ..... design basis report

DLC ..... decision level concentration

ERRG ..... Engineering/Remediation Resources Group

FCR ..... Field Change Request

FWV ..... Field Work Variance

HDPE ..... high-density polyethylene

HPNS ..... Hunters Point Naval Shipyard

IEJV ..... Innovex-ERRG Joint Venture

LFG ..... landfill gas

msl ..... mean sea level

Navy ..... Department of the Navy

NCP ..... National Oil and Hazardous Substances Pollution Contingency Plan

PCB ..... polychlorinated biphenyl

PQCM ..... Project Quality Control Manager

PRSO ..... Project Radiation Safety Officer

RA ..... remedial action

RACR ..... Remedial Action Completion Report

RASO ..... Radiological Affairs Support Office

RAWP ..... remedial action work plan

RD ..... remedial design

RI/FS ..... Remedial Investigation/Feasibility Study

RFI ..... Request for Information

ROC ..... radionuclide of concern

ROD ..... Record of Decision

RPM ..... Remedial Project Manager

ROICC ..... Resident Officer in Charge of Construction

RSY ..... radiological screening yard

Shaw ..... Shaw Environmental, Inc.

SSHO ..... Site Safety and Health Officer

UCSF ..... University of California, San Francisco

WCA ..... Waste Consolidation Area

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1.0 Introduction

This report summarizes the construction quality assurance (CQA) activities performed by the Innovex-ERRG Joint Venture (IEJV) for Phase II of the Remedial Action (RA) for Parcel E-2 at Hunters Point Naval Shipyard (HPNS). Phase II of the RA was implemented by Aptim Federal Services, LLC (Aptim).

The Final Record of Decision (ROD) presented the selected remedy for Parcel E-2, (Department of the Navy [Navy], 2012). This remedy consists of three primary components: (1) excavation and offsite disposal of contaminated soil, sediment, and debris in selected areas; (2) containment of remaining contamination following grading and onsite consolidation of contaminated soil, sediment, and debris in selected areas; and (3) monitoring, maintenance, and institutional controls to protect human health and the environment and to ensure the integrity of the remedy. The remedy selected in the ROD protects the public health and welfare and the environment from actual or threatened releases of pollutants, chemicals, or hazardous substances associated with solid waste, soil, shoreline sediment, groundwater, and landfill gas (LFG) at Parcel E-2.

The document was developed and the remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (Title 42 United States Code Section (§) 9601, et seq.), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 Code of Federal Regulations Part 300).

Following the ROD for Parcel E-2 (Navy, 2012), a remedial design was developed and submitted by Engineering/Remediation Resources Group, Inc. (ERRG) in the Final Design Basis Report (DBR) (ERRG, 2014a). This DBR describes how the remedy will meet the requirements of the approved ROD. The DBR includes the applicable or relevant and appropriate requirements (ARARs) from the ROD and summarizes how each design component addresses the ARARs.

The RA for Parcel E-2 described within the DBR was divided into separate implementation phases by the Navy as described in Section 3.0. Each phase of the RA addresses individual components of the remedy that are independent of one another. This CQA Summary Report addresses CQA monitoring activities conducted in support of Phase II of the RA which was implemented by Aptim in accordance with the *Final Work Plan, Remedial Action, Parcel E-2, Hunters Point Naval Shipyard, San Francisco, California*, prepared by Aptim when it was known as CB&I Federal Services LLC (CB&I, 2016). The Phase II RA portions of the selected remedy includes the construction of the shoreline revetment; site grading and consolidation of excavated soil, sediment, and debris; and the upland slurry wall installation. The remaining

components of the DBR will be implemented during the later phases of construction, which will be awarded by the Navy under separate contracts.

1.2 Organization

The Construction Quality Assurance Plan (CQAP) prepared as part of the remediation design (ERRG, 2014b) specifies that the CQA Manager will provide a final summary report on CQA activities performed at the site. The CQA Summary Report will include at a minimum, the following information:

- A brief description of the project, including type of facility, name of site, location, altitude, name of owner, design engineer, general contractor, and all major subcontractors.
- *A detailed description of the cover and lining systems, including surface area, cross sections, and a summary of all materials used.*[1]
- A chronological summary of construction activities.
- Photographic documentation, including photographs of the site at different phases of construction, photographs of construction details, and photographs of all CQA operations.
- A general record of activities, such as dates of performance of CQA operations, number and names of CQA Monitors, *and number and names of geosynthetic installer's personnel.*[1]
- *QA sampling and testing locations.*[1]
- Copies of all CQA data sheets and records completed during construction of the remedy.
- *All CQA field and laboratory test results, as well as a tabulated summary of the results.*[1]
- A discussion of special problems encountered and their solutions.
- A discussion of significant changes from the design and project specifications.
- *QA as-built survey records.*[1]
- *CQA record drawings, which include the geomembrane panel's layout and all survey conformance data.*[1]
- A summary statement, sealed and signed by the CQA Manager, documenting that CQA was conducted in accordance with the CQA Plan and, based on visual observations and data generated in accordance with the CQA Plan, the remedy and related features shown on the construction drawings were constructed in

[1] The italicized sections refer to information that is not applicable to Phase II activities, and will be addressed in later reports in conjunction with later Phases of construction.

accordance with design drawings and project specifications, except as properly authorized and documented in the CQA Summary Report.

Note - Several of these items are not applicable to Phase II activities and will be addressed in the later phases of work.

This summary Report references figures, tables, and appendices from the current version of the (Draft) Final Remedial Action Completion Report for Parcel E-2 (Phase II) prepared by Aptim (Aptim, 2020)[2]. Additionally, the following appendices are included with this Summary Report:

- Daily CQA Reports (Appendix A)

1.3 Responsible Parties

The responsible parties involved in the Parcel E-2 Phase II RA included the Navy, the Design Engineer, the Prime Construction Contractor, and the CQA Consultant. The technical personnel for each company, who were key participants in the construction, are listed in Section 1.3 of this report.

The Navy is the owner of the site and the lead agency for the work, and is responsible for final acceptance or approval of all remedial action work.

ERRG was the Design Engineer working for the Navy, and prepared the Final Design Basis Report (DBR) (ERRG, 2014). As the Design Engineer, ERRG was responsible during construction for interpreting and answering design questions, reviewing requests for information (RFIs) and/or providing design modifications, and reviewing material submittals and field modifications if they did not meet the requirements of the project specifications. ERRG's responses were communicated through the Navy.

Aptim was the Prime Contractor for the project, responsible for all the construction activities for Phase II. Aptim was also responsible for the Radiological Characterization Surface Surveys. The following subcontractors performed services under Aptim:

- Yerba Buena Engineering & Construction, Inc. (Yerba Buena), out of San Francisco, California, was responsible for the seawall installation and the headwall installation for the Freshwater Wetlands outfall.
- Cascade Drilling was responsible for the installation of the piezometers, the monitoring wells, and the leachate monitoring/extraction wells.

[2] The references and information used in CQA Summary Report will need to be updated when the Draft Final Remedial Action Completion Report for Parcel E-2 is finalized and approved.

- Geo-Solutions, Inc. was responsible for the Upland Slurry Wall installation.
- NOREAS Inc. was responsible for biological surveys, sweeps, and compliance monitoring during construction.
- Bellecci & Associates was responsible for site surveying under the supervision of a California-licensed land surveyor, to provide construction layout and document the final as-built locations and elevations.
- Smith-Emery Geotechnical Services. Inc. was responsible for geotechnical testing services for construction including geotechnical laboratory testing and field compaction and concrete testing.

The Innovex/ERRG Joint Venture, as direct contractor to the Navy, was responsible for CQA monitoring of construction activities during Phase II.

1.4 Project Technical Personnel

The key technical personnel involved in the Phase II RA construction are listed below:

Navy BRAC PMO West (Owner)

- Hamide Kayaci, Remedial Project Manager (RPM) (2016-2018)
- Leslie Howard, RPM (2018-2019)
- Doug De Long, Caretaker Site Office (CSO)
- Shirley Ng, Resident Officer in Charge of Construction (ROICC)
- Glenwood (Tom) Ivey, CSO

Aptim (formerly CB&I)

- Lisa Bercik, Project Manager (2016-2017)
- Nels Johnson, Project Manager (2017-2019)
- Chris Hanif, Project Quality Control Manager (PQCM) (2016-2017)
- Mark Vennemeyer, Site Safety and Health Officer (SSHO) (2016 – 2017), PQCM (2017 -2018)
- Mark Egan, (SSHO) (2019-2019), PQCM (2019)
- Michael Ayala, P.E., Technical Manager
- Michael Lightener, Field Geologist
- Randall Killpatrick, Project Radiation Safety Officer (PRSO)
- Sean Orman, Construction Manager

Innovex-ERRG Joint Venture

- Doug Bielskis (ERRG), P.E., Project Manager/Engineer of Record
- Peter Loveridge (ERRG), P.E., CQA Manager/Design Engineer

- Chris Heltne (Innovex), CQA Monitor
- Albert Simmons (Innovex), CQA Monitor
- Adam Klein (Innovex), CQA Monitor
- Allegra Pieri (Innovex), CQA Monitor

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2.0 Background

The following sections describe the facility, location, and general history of Parcel E-2 remediation activities. This background section is provided to summarize the general conditions at the site.

2.2 Site Description

HPNS is located in southeastern San Francisco on a peninsula that extends east into San Francisco Bay (Figure 1). HPNS consists of 866 acres: 420 acres on land and 446 acres under water in the San Francisco Bay. Parcel E-2 consists of 47.4 acres of shoreline and lowland coast along the southwestern portion of HPNS, and contains four distinct areas (Figure 2):

- The “Parcel E-2 Landfill,” located in the north-central part of Parcel E-2
- The “Panhandle Area,” located west and southwest of the Parcel E-2 Landfill
- The “East Adjacent Area,” located to the east of the Parcel E-2 Landfill
- The “Shoreline Area” located at the edge of San Francisco Bay

A small portion of the Parcel E-2 Landfill extends north onto property owned by the University of California, San Francisco (UCSF) (Figure 2).

Parcel E-2 was created by filling in the bay margin with various materials, including native soil, rock, and sediment, as well as construction and industrial debris. The ground surface elevation at Parcel E-2 varies from approximately 30 feet above mean sea level (msl) in the northern portion of the parcel to a few feet above msl along the southwestern portion of the parcel. The Parcel E-2 Landfill is a 22-acre area where the Navy disposed of various shipyard wastes from the mid-1950s to the early-1970s. After the 22-acre landfill closed in the early 1970s, the Navy covered it with 2 to 5 feet of soil. An additional interim Parcel E-2 Landfill multilayer cap was constructed over 14.5 acres of the landfill that was set afire by an August 2000 brush fire. The interim landfill cap was constructed to inhibit oxygen migration into the buried waste to prevent more fires from occurring under the capped area.

Fill materials in the East Adjacent, Panhandle, and Shoreline Areas of Parcel E-2 are distinct from the Parcel E-2 Landfill. Specifically, fill materials in the East Adjacent, Panhandle, and Shoreline Areas consist primarily of soil, sediment, and rock with isolated solid waste locations that are not contiguous with solid waste in the Parcel E-2 Landfill. The characteristics of the East Adjacent, Panhandle, and Shoreline Areas are described below.

- The East Adjacent Area was created by filling in San Francisco Bay prior to the 1950s with soil and construction debris. Some industrial waste was disposed of in parts of the East Adjacent Area which were addressed under an early removal action and Phase I of the Remedial Action (Gilbane, 2017).
- The Panhandle Area was created by filling in San Francisco Bay in the 1950s with soil and construction debris. The Navy disposed of metal slag in a part of the Panhandle Area and tested ship-shielding technologies in another part of the Panhandle Area. These areas were partially addressed under an earlier removal action (Gilbane, 2017).
- The Shoreline Area is adjacent to San Francisco Bay and contains contaminated sediment above msl that will be addressed by the selected remedy for Parcel E-2. Contaminated sediment below msl will be addressed by the selected remedy for Parcel F, the Navy's property offshore of HPNS.

Several removal actions have been completed at Parcel E-2, chemicals of concern and chemicals of ecological concern still remain on site. A detailed summary of the removal actions completed through 2006 can be found in Section 3.8 of the Remedial Investigation/Feasibility Study (RI/FS) Report (ERRG and Shaw Environmental, Inc. [Shaw], 2011), and the post-excavation conditions following these actions were considered in evaluating the nature and extent of contamination in the RI/FS Report and its radiological addendum. Two Time-Critical Removal Actions (at the Polychlorinated Biphenyl [PCB] Hot Spot Area and the Ship-Shielding Area) were completed in late 2012 and documented in removal action completion reports finalized in 2013 (Shaw, 2013a and 2013b).

Phase I Remediation Activities included additional removal and backfilling of "Hot Spots" across the site. Phase I also included the installation of the Nearshore Slurry Wall. These activities were conducted under a separate contract, and recorded in the Draft Remedial Action Completion Report, Hot Spot Delineation and Excavation and Nearshore Slurry Wall Installation Remedial Action, Parcel E 2 prepared by Gilbane Federal (Gilbane, 2017).

3.0 Phase II Construction Activities

As mentioned previously, the RA is being implemented in phases. The major RA construction phases are outlined below:

RA Construction Phase I (completed under separate contract)

- Preliminary land surveying
- Excavation and offsite disposal of hot spots
- Construction of a portion of the groundwater control systems (installation of Nearshore Slurry Wall)

RA Construction Phase II (current phase)

- Preliminary land surveying
- Construction of shoreline revetment structure
- Excavation for freshwater and tidal wetlands
- Construction of remaining portion of the groundwater control systems (installation of upland slurry wall, French drain, piezometers, and groundwater wells)
- Site grading and consolidation of excavated soil, sediment, and debris
- Radiological surface scanning, remediation, and clearance

RA Construction Phase III (To be completed under future contract or contracts)

- Construction of protective liner, demarcation layer, and soil cover
- Installation of LFG extraction and treatment system
- Construction of surface water control features
- Soil placement (including demarcation layer) and planting for freshwater and tidal wetlands
- Installation of cover vegetation
- Installation of perimeter fence and warning signs

3.2 Remedial Action Construction Activities Timeline

The Phase II RA construction activities took place at Parcel E-2 from April 2016 through May 2019. There were some periods where the activities were reduced and crews demobilized to address issues or due to inclement weather.

The Phase II RA construction began initially in April 2016 and resumed in August 2016 after a brief shut down. However, Aptim soon demobilized as the pre-existing radiological screening yard (RSY) pads they had planned to use were not in good repair

and could not be used as is. This was an issue that needed to be resolved by the Navy and the previous contractor. During these construction periods, Aptim conducted the following activities in accordance with the Remedial Action Work Plan (RAWP) (CB&I, 2016) in preparation for full mobilization, including the following:

- Updated and prepared excavation and radiological work permits.
- Notified the HPNS CSO and the ROICC, the Navy RPM, the local fire department, and HPNS security of the upcoming work.
- Held pre-construction and kick off meetings with the Navy and other contracted personnel.
- Noreas, Inc. performed a focused biological survey to identify species on the site that might require special protection or consideration during construction.
- Bellecci & Associates, Inc. completed a preconstruction topographic survey on April 27, 2016, providing data to establish horizontal and vertical controls and identify any changes in site conditions that have occurred between the development of the remedial design (RD) and mobilization to implement Phase II of the remedy.
- Notified Underground Service Alert North and performed preconstruction subsurface utility surveys to locate publicly and privately-owned underground utilities using magnetic and electromagnetic techniques.
- Established access control points for radiological screening of equipment and personnel entering and leaving Parcel E-2.
- Implemented environmental protection measures, including best management practices against stormwater pollution.
- Installed an offshore turbidity curtain prior to excavations within the intertidal zone and implemented water quality monitoring during shoreline construction activities.
- Installed temporary security fencing along UCSF boundary.

Aptim remobilized in November 2016 and began the primary work for the Phase II RA construction. Most construction activities were temporarily halted starting in February 2017 due to weather issues, and some equipment was demobilized. Radiological scans/gamma walkover surveys (GWS) of ground surface and excavated materials was continued. Full work was resumed in April 2017. The primary definable features of work, as described in the Remedial Action Completion Report (RACR) (Aptim, 2020), started in November 2016 and included the following:

- Site Grading to Final Subgrade –This activity was initiated with excavations in the Panhandle Area in late 2016 and continued across all the areas of Parcel E-2 through 2018.

- Final Radiological Characterization Surface Survey – This activity was ongoing throughout the project as each area was excavated to the initial subgrade elevations and then backfilled, where needed, to the final elevations.
- Excavation to Construct Future Wetlands – The Future Wetlands refer to two distinct areas shown on Figure 9 of the DBR; the Freshwater Wetlands and the Tidal Wetlands (ERRG, 2014a). The excavation of the planned Freshwater Wetlands started in May 2017; however, due to the presence of lead found in the excavation, additional over-excavation and step-outs were required before the excavation in this area was completed in June 2018. The Tidal Wetlands excavation was initiated in July 2017 and was completed in February 2018. Due to tidal influences, the tidal wetlands area backfill was started immediately behind the excavation using imported soil to construct the bridge layer. The bridge layer placement was completed in March 2018. The backfill to subgrade and then placement of the bridge layer for the Freshwater Wetlands was not started until July 2018, after the step-out over-excavation was completed.
- On-site Consolidation of Radiologically-Cleared Soil, Sediment, and Debris – Onsite segregation and consolidation of debris began in May 2017, followed by additional processing by soil screening starting in September 2017. The process of placing the debris in the Waste Consolidation Area (WCA) began in May 2018 and was completed in July 2018 with the placement and compaction of the final cover material over the WCA.
- Construction of Foundation Soil Layer – Excavated soil that had been radiologically cleared and import soil was used to backfill areas as required to meet the final grades for the foundation layer. The backfill operations and grading began in August of 2017 and continued with final grading in the spring of 2019.
- Upland Slurry Wall Installation – The upland slurry wall construction began with the construction of a working platform in October 2017 after approval of the proposed cement-bentonite slurry mix design. The slurry mixing plant was mobilized to the site in November 2017. The actual installation of the slurry wall was completed between 11/14/17 and 12/5/17. However, the installation was not completed as designed due to a subsurface obstruction. A geo-probe was mobilized to the site on 9/17/18 to better define the limits of the obstruction.
- Excavation of Offshore Soil and Sediment from Parcel F – The excavation and backfill along the perimeter of Parcel F began in December 2017 and was completed in March 2018.
- Shoreline Revetment Construction – Once the Offshore excavation was completed in Parcel F, work on the shoreline revetment began. The upland excavations to place and anchor the geogrid component of the revetment started

in February 2018. The first test section for the shoreline revetment was installed on 4/4/18. Following the test section, the first phase of the revetment construction began, installing the geogrid, geotextile, filter stone, and armor rock portion of the revetment below the proposed footing elevation for the seawall. This included cutting down the fiberglass sheetpile wall installed for the construction of the nearshore slurry wall as well as the older pre-existing steel sheetpile wall where it interfered with the proposed geogrid placement. The first phase of the shoreline revetment was within the tidal zone, which required adjusting the work schedule around the low tides. This work was completed in June 2018. The revetment construction was then paused until the concrete seawall could be installed. The revetment construction continued after the seawall installation was complete and the final armor stone and anchor soil was placed between October and December 2018.

- French Drain Installation – The French drain was installed between 7/17/18 and 7/20/18 upgradient of the upland slurry wall. The outlet pipe was capped and buried. The outlet structure for the French drain will be installed and the pipe extended to meet it at a later date.
- Seawall and Headwall Construction – The Subcontractor, Yerba Buena, mobilized to the site and began seawall construction on 8/1/18 and finished 10/13/18. They also poured the Freshwater Wetlands outfall headwall in two stages, on 10/11/18 the footing was poured, and then they completed the vertical section with a pour on 10/13/18.
- Perimeter Channel Outlet Pipe - The seawall construction included pouring concrete around the new channel outfall pipe at the eastern property line of the site on 10/13/18. Armor stone was placed around the outfall pipe on the bay side of the seawall. The inland end of the outfall pipe was capped and buried until the drainage system is completed in the later phases of the RA construction.
- Installation of Monitoring and Extraction Wells and Piezometers – Cascade Drilling began installation of the piezometers, monitoring wells, and leachate monitoring/extraction wells along the nearshore slurry wall alignment on 12/3/18. However, ground conditions at the site due to rain and weather proved untenable so the work was postponed until January 2019. Again, after installing only a few accessible wells, the work was postponed until April 2019. At that time, the remaining wells and piezometers were installed and the well development was completed on 5/9/19.

The major construction activities are discussed in more detail in the following sections.

3.3 Site Grading to Final Subgrade

The site was excavated to the design subgrade elevations shown on Design Drawing C-12 of the DBR (ERRG, 2014a). Aptim excavated the soil in 12-inch lifts down to the design elevation. Prior to excavation of each lift, a radiological surface survey was performed for the in situ soil to identify and allow the removal and segregation of any potential contamination and/or low level radiological objects. The excavated soil was transferred to the RSY pads for radiological processing. Large debris, including concrete, steel, and wood were segregated from the soil and handled separately.

The excavation to subgrade began in the upper Panhandle Area and continued with the North Perimeter Area, the East Adjacent Area and the removal of 12 inches of soil from the existing landfill cover. A total of 112,873 cubic yards (cy) of soil and waste were excavated to meet the design subgrade elevations. As-Built Drawing C4 in Appendix C of the RACR provides a summary of the volume and depth of cuts across the site (Aptim, 2020).

3.4 Final Radiological Characterization Surface Survey

The final radiological characterization surface survey was performed after each area of the site was excavated to the final subgrade elevations. The survey was used to identify and remove radiological contamination to a depth of 1 foot below the final excavated subgrade elevations across the entire Parcel E-2 site. Radiological characterization surveys included a gamma scan over all accessible unsaturated areas, static measurements, systematic sampling, and biased sampling, if required.

The Parcel was divided into a grid of survey units (SU) where each SU had a maximum area of 1,000 meters. Each SU was evaluated separately. If sample results exceeded the radionuclide activity release criteria, the location was remediated by removing an additional foot of soil, which was designated low-level radiological waste, and then collecting additional radiological samples.

The final data set for each SU was reviewed by the Radiological Affairs Support Office (RASO). Upon their approval, the SU was cleared for placement of backfill for the foundation layer construction.

3.5 Excavation to Construct Future Wetlands

The tidal and freshwater wetland areas were excavated to the design subgrade elevations shown on Design Drawing C-12 of the DBR (ERRG, 2014a). Following the excavation to grade, confirmation soil samples were collected from the bottom and sidewalls of the excavations and sent off site for chemical analyses for total copper,

total lead, polychlorinated biphenyls, and total petroleum hydrocarbons. Based upon the results of the chemical analyses, in comparison to the hot spot cleanup goals listed in the Final Phase II Remedial Action Work Plan (CB&I, 2016), additional excavations were necessary for the freshwater wetlands to remove impacted soil, until the final confirmation samples met hot spot cleanup goals. A total of 51,902 cy of soil, sediment, and debris were removed from the wetland areas. Additionally, Aptim removed approximately 1,204 cy of possible methane-generating debris from the vicinity of the freshwater wetlands.

3.6 On-site Consolidation of Radiologically-Cleared Soil, Sediment, and Debris

The designated WCA was located in the northwest corner of the site abutting and overtopping a portion of the existing landfill. This WCA received radiologically-cleared soil, sediment, and non-recyclable or non-reusable debris collected during the clearing and excavation of the site. The debris was physically separated from the soil using screening equipment and then the debris was consolidated and buried in the WCA, a minimum of 5 feet below the proposed foundation layer elevations. Aptim's activities generated an estimated 9,754 cy of debris. This final volume exceeded the capacity of the original footprint of the WCA proposed in the DBR (ERRG, 2014a). Aptim requested and received approval to expand the footprint of the WCA and increase its capacity as long as it met the placement and separation requirements below the final grades of the foundation layer. The expanded footprint of the WCA is shown on As-Built Drawing C5 in Appendix C of the RACR (Aptim, 2020).

3.7 Construction of Foundation Soil Layer

Following the RASO approval of the final subgrade surface, Aptim placed backfill for the construction of foundation soil layer. The foundation layer was constructed using excavated soil that had been processed on the RSY pads and radiologically cleared for reuse, as well as additional soil salvaged from the deconstruction of the RSY pads. The soil was placed in lifts to meet the lines and grades shown on Design Drawing C13 of the DBR (ERRG. 2014a). The 12-inch lifts were compacted to a minimum density of 90 percent with a maximum dry density ±3 percent optimum. Smith-Emery Geotechnical Services, a third-party contractor, performed the geotechnical laboratory testing and field confirmatory tests following the required testing frequencies for the nuclear gauge density testing, sand cone testing, and moisture content testing. The results of their compaction testing are included in Appendix M, Quality Control Testing Results, of the RACR (Aptim, 2020).

In the tidal and freshwater wetland areas, Aptim placed approximately 4,620 cy of clean import soil to construct the soil bridge layers.

3.8 Upland Slurry Wall Installation

Geo-Solutions, Inc. was subcontracted by Aptim to install the upland slurry wall. After getting approval of the proposed cement-bentonite slurry mix design that met the required strength, permeability and compatibility requirements and specifications in the DBR (ERRG, 2014a), work on the upland slurry wall proceeded. Aptim constructed the working platform along the proposed alignment and Geo-Solutions, mobilized their equipment, including a slurry mixing plant, to the site in November 2017. The installation was straightforward as the slurry wall had a target elevation of feet 10 below msl, rather than being required to key into a specific geologic formation. However, the installation was not completed as designed due to a subsurface obstruction at approximately 1.5 below msl along some 200 feet of the overall 571-foot alignment. Geo-Solutions completed the slurry wall to the depths shown in Drawing C7 of the RACR (Aptim, 2020), and then installed the final trench cap using the same cement-bentonite slurry mix along the entire length of the upland slurry wall.

After discussions with the Navy, Aptim agreed to do additional investigation to better determine the nature of the obstruction. A Geo-Probe was mobilized to the site on 9/17/18 and direct push methods were used to better define the limits of the obstruction. Based upon their investigation, APTIM recommended leaving the slurry wall as currently constructed with no further attempt to reach the target depth in the RACR (Aptim, 2020). The Navy has not yet responded to that recommendation.

3.9 Excavation of Offshore Soil and Sediment from Parcel F

The excavation of offshore soil and sediment from Parcel F was done in anticipation of the shoreline revetment construction. The excavation was done to provide a buffer between the proposed shoreline revetment and any future cleanup activities within Parcel F. Soil and sediment were excavated 1.5 to 2.5 feet below ground surface and out a minimum of 6 feet offshore of the proposed toe of the revetment. As-Built Drawing C2 of the RACSR shows the extent of the excavations (Aptim, 2020).

The excavations were done in sections, within limited low tide windows, and spoils were first placed in plastic lined drying cells and allowed to drain, and then later transported to the RSY pads for radiological screening. The excavations were backfilled with approximately 666 cy of clean imported soil.

3.10 Shoreline Revetment Construction

Once the offshore excavation was completed in Parcel F, work on the shoreline revetment began.

The shoreline revetment has the following four component layers, an underlying geogrid layer that runs from the toe of the revetment up the slope and across the upland area where it will be anchored by backfill and the final cover soil to provide stability reinforcement; a filter fabric layer that lays on the slope above the geogrid to provide separation between the fine-grained subgrade soil and overlying filter stone layer; a filter stone layer provides a bedding layer for the overlying armor rock layer; and an armor rock layer protects the slope and the shoreline from tidal erosion. Atop the revetment, a concrete seawall was installed to provide additional protection from wave run up in the future. The footing and lower half of this seawall are embedded within the revetment. This required that the revetment be installed in phases. A cross-section of the shoreline revetment and the seawall is provided in As-Built Drawing C3 in the RACR (Aptim, 2020).

The first phase included the excavation of the upland area and the intertidal zone at the toe of the revetment, followed by the installation of the geogrid, filter fabric, and a portion of the filter stone and armor rock below the elevation of the base of the seawall footing. This phase also required the removal of sections of two sheetpile walls that impacted the placement of the geogrid and subsequent layers. A pre-existing steel sheetpile wall extended across a portion of the upland area where the geogrid was to be installed. The top of this sheetpile was cut down to a minimum of 1 foot below the proposed geogrid placement elevation using a plasma cutting tool. The removed portion of the sheetpile was then disposed of. The second sheetpile wall was associated with the construction of the nearshore slurry wall in the previous phase of the RA construction. This was a fiberglass-reinforced plastic sheet pile that had been installed as temporary shoring to create a working platform for the slurry wall installation. This sheetpile was located under the slope of the proposed shoreline revetment. It was cut down to an elevation of 3.5 feet to allow clearance for the geogrid layer to be placed. The fiberglass-reinforced plastic sheet pile was removed using a chop saw and then disposed of.

The upland excavations to place and anchor the geogrid layer of the revetment required creating a level surface at elevation 6.5 feet above msl where the geogrid layer would be placed and anchored to provide stability for the completed shoreline revetment. The length of each geogrid panel varied based upon stability analyses done at intervals along the shoreline revetment alignment. The existing soil above 6.5 feet elevation was removed in the same manner as the excavation to subgrade. Aptim excavated the soil

in 12-inch lifts, following a radiological surface survey of the in situ soil to identify and allow the removal and segregation of any potential contamination and/or low level radiological objects, down to the design elevation. Large debris, including concrete, steel, and wood were segregated from the soil and handled separately. The excavated soil was transferred to the RSY pads for radiological processing.

Once the level subgrade was established, the geogrid layer (Tencate Miragrid® 22XT) was installed across this area perpendicular to the slope of the revetment. Temporary anchor soil was placed up to the final design elevations to hold the geogrid in place. Then excavations in the intertidal zone at the toe of the revetment were started. These excavations required a keyway cut at the toe of the proposed revetment down to 4.5 feet below msl and then sloped up at approximately 3:1. The excavations were done in short sections within limited low tide windows that would allow for the excavation of the soil and the placement of the geogrid, filter fabric, filter stone and armor rock layers before the tide returned.

Once the excavation for each section was complete, the geogrid was unrolled down the slope to the toe of the revetment, filter fabric panels were placed perpendicular to the shoreline with a 2-foot overlap, followed by a 19-inch layer of filter stone and a 34-inch layer of armor rock up to the elevation of the seawall footing. This operation continued at every favorable low tide window, including at night and early morning, until the lower half of the armor rock was in place along the entire 1,900-foot length of the shoreline revetment alignment. At that point, the revetment construction was halted to allow for the installation of the concrete seawall.

The spoils from the shoreline excavation were first placed in plastic lined drying cells and allowed to drain, and then later transported to the RSY pads for radiological screening.

Once the seawall was completed. The placement of filter stone and armor rock on the bay side of the seawall was resumed to complete the revetment construction up to 9 feet above msl. On the inland side of the seawall, additional soil was brought to cover the concrete footing of the seawall and bring the temporary anchor soil over the geogrid adjacent to the seawall up to the final design grades.

The final alignment and typical cross-section for the completed revetment is provided on As-Built Drawings C2 and C3 in the RACR (Aptim, 2020).

3.11 French Drain Installation

The French drain was installed upgradient and parallel to the upland slurry wall. It consisted of a trench excavated to 6 feet msl and backfilled with drain rock wrapped in geotextile. A perforated 4-inch diameter schedule 80 polyvinyl chloride collection pipe was set at bottom of the trench to collect groundwater diverted by the Upland Slurry Wall and direct it through the outlet pipe into the proposed Freshwater Wetlands. Aptim installed a section of this pipe and capped it. The pipe will be extended and tied to a concrete aeration apron at the discharge point into the freshwater wetlands that will be constructed under a separate contract.

The alignment of the French drain and the location of the end of the pipe stub are shown on As-Built Drawing C6 in the RACR (Aptim, 2020).

3.12 Seawall and Headwall Construction

Once the first phase of the shoreline revetment was completed, the seawall construction began. Yerba Buena was the subcontractor for the concrete work. Aptim prepared a compacted aggregate base for the footings ahead of Yerba Buena. Yerba Buena then installed the formwork and rebar per the structural design drawing S1 from the DBR (ERRG, 2014a). A 5,000 pound per square inch (psi) concrete mix was used for the seawall. Smith-Emery was on site to conduct slump tests of the concrete and collect concrete test cylinders for strength testing. The results of the concrete testing are included in Appendix N, Quality Control Testing Results, of the RACR (Aptim, 2020).

A total of 1,778 feet of seawall was installed per the design with the following exceptions. Modifications were made in response to RFI 007, including a change to how the top of the seawall was finished and a redesign of the east end of the seawall to allow for the penetration by the perimeter channel outlet pipe discussed in Section 3.12.

Yerba Buena also installed the freshwater wetlands outfall headwall. This was done in two stages: the first stage was pouring the concrete for the footing of the headwall, and then two days later, forming up and pouring the vertical section of the headwall. The headwall has cutouts for an outfall pipe from freshwater wetlands which will be installed under a different contract.

The final alignment and typical cross-section for the completed seawall including the location of the completed headwall are provided on As-Built Drawings C2 and C3 in the RACR (Aptim, 2020).

3.13 Perimeter Channel Outlet Pipe

The perimeter channel outlet pipe is part of the surface water drainage system for the final RA, which will be completed under a future contract. However, the outlet pipe will pass through the shoreline revetment and the seawall, so it needed to be installed concurrent with the shoreline revetment construction. The 20-inch DR17 solid wall high-density polyethylene (HDPE) pipe was installed at the elevations provided in the DBR in accordance with Design Drawing C21 (ERRG, 2014a). Then the seawall and shoreline revetment were constructed around the outlet pipe. The seawall had to be redesigned per RFI-007 to eliminate a conflict with the seawall footing. The inland end of the outfall pipe was capped and buried until the rest of the surface water drainage system is completed in the later phases of the RA construction.

3.14 Installation of Monitoring and Extraction Wells and Piezometers

Once the shoreline revetment and seawall were completed, Aptim had access to install the four piezometers, three monitoring wells, and 13 leachate monitoring/extraction wells along the nearshore slurry wall. Poor site conditions, inclement weather, and scheduling conflicts spread the installation of these wells and piezometers over several months. Most of the locations required drilling through the geogrid layer installed as part of the shoreline revetment. Aptim prepared the proposed locations by excavating down to the geogrid layer, made cuts through the geogrid to minimize damage of the geogrid during drilling, and then backfilled the excavations, leaving sonotubes in place to guide the drilling effort.

Cascade Drilling provided a Geoprobe® 7720 drill rig equipped with direct-push and hollow-stem auger capabilities to install the wells. The direct-push feature was used to collect continuous cores in acetate sleeves to allow Aptim geologist to log the lithology and identify the target bay mud depths at each location. This allowed the screen depths and lengths to be set by the geologist. The hollow-stem auger capability was then used to install the wells and piezometers.

The 13 leachate monitoring/extraction wells were installed approximately every 100 feet along the landfill side of the nearshore slurry wall alignment. Extraction well EX Well-013 is actually placed right at the end of the nearshore slurry wall alignment, due to encountering refusal at the first two locations attempted. The four piezometers and the three monitoring wells were installed adjacent to the shoreline revetment.

Per Field Change Request (FCR) - 006, Aptim did not install the final surface well completions for any of the wells and piezometers. These were deferred to a future

contract as the majority of the locations are surrounded by the temporary soil anchor, over the geogrid layer, which will be removed and replaced by the final cover system under a later contract.

The final locations of the wells and piezometers are provided on As-Built Drawing C2 of the RACR and the boring and well construction logs are located in Appendix F of the RACR (Aptim, 2020).

4.0 CQA Monitoring Activities

The CQA activities performed by the Innovex-ERRG Joint Venture for Phase II of the RA construction were somewhat limited in scope. The CQA manager attended the weekly construction quality control (CQC) meetings and reviewed the daily CQC and daily production reports throughout construction as well as reviewing any RFIs, FCR/field work variances (FWV) and submittals when the Navy RPM requested input. However, an onsite presence was not maintained for the full duration of the Phase II RA construction. CQA Monitors were only maintained on site for specific construction activities, mainly related to installation of the more critical features. These specific features included the following:

- Shoreline Revetment Construction
- Seawall and Headwall Construction
- Installation of Monitoring and Extraction Wells and Piezometers

Whenever the CQA Monitors were on site, a CQA report was generated that documented the RA construction activities and provided a photographic log related to the above features. CQA reports are included as Appendix A. The next sections review the CQA activities conducted for each of the definable features of work.

4.2 Final Radiological Characterization Surface Survey

Throughout the final radiological characterization surface survey across the site, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

Deficiencies/Issues: Per FCR 001, Aptim requested updates to Parcel E-2 SAP Worksheet #15.1 to show laboratory reporting limits for radionuclides of concern (ROCs) as decision level concentration and not minimum detectable concentration, to be consistent with historical reporting formats at Hunter's Point. The request was approved. The complete FCR and responses can be found in Appendix H, Field Change Requests, of the RACR (Aptim, 2020).

Per FCR 003, Aptim requested adding a device to the list of approved equipment for performing in-situ gamma count-surveys, the ORTEC Trans-Spec-DX-100, a more portable scanner. This request was approved. The complete FCR and responses can be found in Appendix H, Field Change Requests, of the RACR (Aptim, 2020).

Per the approved RFI 003, the background reference area for determining radiological instrument specific investigation levels was relocated to the soil area behind Building 810. The original area identified as the background reference area in Parcel B was no longer accessible due to the installation of a new durable cover. The complete RFI and responses can be found in Appendix Q, Construction Submittals, of the RACR (Aptim, 2020).

4.3 Site Grading to Final Subgrade

Throughout the excavation and site grading activities to meet the final subgrade, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

Deficiencies/Issues: Per FCR 002, Aptim requested the ability to stack up to five lifts of excavated soil onto RSY pads for radiological processing to reduce handling of soil and save space on site, each lift would be separated by a plastic liner. This request was approved. The complete FCR and responses can be found in Appendix H, Field Change Requests, of the RACR (Aptim, 2020). This did result in scraps of the plastic liner being mixed in with the soil when they were re-used as backfill.

Per FWV 004, Aptim clarified that the top 12 inches of the existing landfill cover soil will be radiologically screened in situ in one step rather than as two separate 6-inch lifts prior to excavation. The complete FWV can be found in Appendix H, Field Change Requests, of the RACR (Aptim, 2020).

4.4 Excavation to Construct Future Wetlands

Throughout the excavation to construct future wetlands and the placement of backfill and import soil as the bridge layer in the tidal and freshwater wetlands areas, including the additional over-excavation and step outs to remove lead contamination in the freshwater wetlands, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

Deficiencies/Issues: Per FWV 005, as Aptim was over-excavating the freshwater wetlands area due to elevated lead results, they excavated a test pit outside the current

excavation to try to determine extents of the contamination. Based on the results of sampling in this test pit, Aptim proposed extending the excavation to this test pit and skip the required step-out sampling between the existing excavation and the test pit location. FWV 005 also requested adding an alternate laboratory, Enthalpy Analytical, to allow shorter turnaround times for sampling results. FWV 005 was approved. The complete FWV and responses can be found in Appendix H, Field Change Requests, of the RACR (Aptim, 2020).

Because the placement of the bridge layer and the placement of the final hydric soil cover within the wetlands area have been split between separate construction phases, the final hydric soil layer will not be placed immediately following the bridge layer. The tidal wetlands area, and to a lesser extent within the freshwater wetlands area, will be subject to tidal and erosion until the final hydric soil layer is installed. Any erosion will necessitate repairs to the bridge layer and possibly the subgrade before the placement of the final covers by a future contractor.

4.5 On-site Consolidation of Radiologically-Cleared Soil, Sediment, and Debris

Throughout the on-site consolidation of radiologically-cleared soil, sediment, and debris in the WCA, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

Deficiencies/Issues: Aptim had concerns because the amount of debris they were collecting exceeded the estimated volume in the DBR. Some of this increase they attributed to the use of large concrete debris in the backfill of the hot spot excavations during the previous phase of the RA.

Per the approved RFI 005, Aptim expanded the overall footprint of the WCA area to accommodate the increased volume of debris collected during Phase II construction activities. The complete RFI and responses can be found in Appendix Q, Construction Submittals, of the RACR (Aptim, 2020).

4.6 Construction of Foundation Soil Layer

Throughout the construction of the foundation soil layer, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities.

Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

The backfill was compacted and compaction testing was conducted by Smith-Emery according to the testing frequencies outlined in the DBR and RAWP. Aptim used soil that had been radiologically cleared as well as imported soil to meet the final grades for the foundation layer.

Deficiencies/Issues: The design elevations for the foundation layer were not met in three locations. The first location is a narrow band between the edge of the existing landfill and the limits of the geogrid anchor. The second area is around the perimeter of the freshwater wetlands and between the landfill and the freshwater wetlands. The third area is in the Panhandle. The Panhandle had originally met the design grades, but Aptim relocated some of the fill in this area to meet the requirements for the temporary soil anchor over the geogrid layer. As-built Drawing C6 in the RACR shows the final foundation grading topography across Parcel E-2 and As-built Drawing C8 shows where the design elevations have not been met.

Aptim considered the backfill shortage of approximately 9,000 cy as the result of a change in conditions, asserting the RD had indicated a balanced cut/fill on site to meet final foundation elevations. While the Navy disagreed, they ultimately removed the import and placement of soil to meet the final foundation elevations from Phase II contract scope and moved it to the next phase of the RA construction.

4.7 Upland Slurry Wall Installation

Throughout the construction of the upland slurry wall, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed the proposed cement-bentonite slurry mix design prior to approval and any RFIs and FCRs/FWVs submitted by Aptim.

Deficiencies/Issues: Per the approved RFI 002, Aptim was permitted to use an alternative cement-bentonite slurry mix, rather than the original soil-cement-bentonite slurry in the design. The complete RFI and responses can be found in Appendix Q, Construction Submittals, of the RACR (Aptim, 2020).

The upland slurry wall installation was not completed as designed due to a subsurface obstruction along approximately 200 feet of the alignment. Aptim was tasked to further investigation to determine a solution. A Geo-Probe was mobilized to the site on 9/17/18 to better define the limits of the obstruction. However, Aptim took no further action to

address the obstruction, neither presenting an FCR or attempting to complete the wall as designed. Based upon their field investigation, which only identified the extent of the obstruction and a review of historic boring information, Aptim concluded the obstruction was a natural formation. They presented this information in the RACR and recommended leaving the slurry wall as currently constructed with no further attempt to reach the target depth (Aptim, 2020). The Navy has not yet responded to that recommendation.

4.8 Excavation of Offshore Soil and Sediment from Parcel F

Throughout the excavation of offshore soil and sediment from Parcel F, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were also reviewed as it became available.

The excavation was backfilled with import soil and no compaction was done as the material was placed within the tidal zone.

4.9 Shoreline Revetment Construction

Throughout the shoreline revetment construction, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

CQA Monitors were on site to observe and verify that excavation and the placement of the different components of the shoreline revetment were done according to the specifications and design drawings in the DBR, including installation of the geogrid, geotextile, filter stone, and armored rock layers. The initial phase of the shoreline revetment construction was done within the tidal zone. The CQA Monitors were on site with the crew as they worked day or night depending upon when the tides were favorable.

After the completion of the first phase and construction of the seawall, CQA Monitors were on site intermittently for the completion of the armor rock on the bay side of the new seawall and the placement of soil on the inland side of the seawall.

The CQA Reports and photo logs for the days the CQA Monitors were on site are included in Appendix A.

Deficiencies/Issues: Following the submittal of RFI-004, the extents of the geogrid layer in the upland area were truncated in three locations to avoid conflict with the existing landfill cover system and the proposed freshwater wetland slopes. The complete RFI and responses can be found in Appendix Q, Construction Submittals, of the RACR (Aptim, 2020).

The initial geogrid panels did not abut/overlap under the shoreline revetment. Aptim made adjustments to correct the issue once this was brought to their attention by the CQA Monitors.

The temporary soil anchor over the geogrid on the upland side of the seawall did not initially meet the required grades for stability of the shoreline revetment. This was resolved by Aptim shifting previously placed soil in the Panhandle Area over to the shoreline to meet the grades for the temporary soil anchor.

4.10 French Drain Installation

Throughout the installation of French drain and outlet pipe, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were also reviewed as it became available.

Deficiencies/Issues: No deficiencies or issues were noted and no RFIs or FCRs/FWVs were submitted by Aptim.

4.11 Seawall and Headwall Construction

Throughout the seawall and headwall construction by the subcontractor, Yerba Buena, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed any RFIs and FCRs/FWVs submitted by Aptim.

CQA Monitors were on site to observe the construction activities and to observe and verify that cast-in-place activities for the seawall installation were done according to the specifications and design drawings in the DBR, including subgrade preparation, form work installation, rebar placement, and the concrete pour. A technician from Smith-Emery was on site to conduct field testing of the concrete mix and collect sample for laboratory strength testing. The results of the laboratory concrete strength testing are included in Appendix N, Quality Control Testing Results, of the RACR (Aptim, 2020).

Deficiencies/Issues: Per the approved RFI 007, the top of the seawall was reconfigured to minimize the long-term potential for chipping and cracking to a sloped cap (as necessary to minimize ponding of water), while maintaining the design requirements for rebar clearance and final height of the wall. Also, per the approved RFI 007, Aptim requested a detail showing how the solid-wall HDPE perimeter channel outlet pipe would pass through the concrete seawall. The Design Engineer for ERRG prepared a detail which required a localized change to the depth of the footing and the overall height of the vertical wall to accommodate the pipe penetration at the design elevations. The complete RFI and responses can be found in Appendix Q, Construction Submittals, of the RACR (Aptim, 2020).

An additional issue was noted in the field by the CQA team and documented in the daily CQA Reports; there was erosion of the subgrade below the completed footing on the bay side of the seawall due to wave action prior to the placement of the revetment armor rock. This was addressed by Aptim by pumping a self-consolidating concrete slurry along select areas of the seawall to fill in the cavities below the footing caused by the tidal erosion prior to finishing the placement of filter stone and armor rock.

4.12 Perimeter Channel Outlet Pipe

Throughout the outlet pipe installation by Aptim and the construction of the seawall around the pipe by the subcontractor, Yerba Buena, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed RFIs and FCRs/FWVs submitted by Aptim. CQA Monitors were on site to observe the construction activities.

Deficiencies/Issues: As noted in Section 4.10, per the approved RFI 007, Aptim requested a detail showing how the solid-wall HDPE perimeter channel outlet pipe would pass through the concrete seawall. The Design Engineer for ERRG prepared a detail which required a localized change to the depth of the footing and the overall height of the vertical wall to accommodate the pipe penetration at the design elevations. The complete RFI and responses can be found in Appendix Q, Construction Submittals, of the RACR (Aptim, 2020).

4.13 Installation of Monitoring and Extraction Wells and Piezometers

Throughout the drilling and installation of the piezometers, monitoring wells and leachate monitoring/extraction wells, the CQA Manager attended the weekly CQC meeting and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available. The CQA Manager also reviewed RFIs and FCRs/FWVs submitted by Aptim.

CQA Monitors were on site to observe the installation activities and to observe and verify the depths, screen intervals, well casing materials and diameters, and well construction sandpack and seals used for each well and piezometer.

Deficiencies/Issues: Per the approved RFI 001, the casings for the 13 leachate monitoring/extraction wells were reduced to 4 inches in diameter from their original 6-inch diameter.

Per FCR 006, Aptim did not install the final surface well completions for any of the wells and piezometers. These were deferred to a future contract as the majority of the new well locations are surrounded by the temporary soil anchor, placed over the geogrid layer, which will be removed and replaced by the final cover system under a later contract. The complete FCR and responses can be found in Appendix H, Field Change Requests, of the RACR (Aptim, 2020).

5.0 Summary Statement

The CQA activities performed by the Innovex-ERRG Joint Venture for Phase II of the RA construction were somewhat limited in scope. The CQA Manager attended the weekly CQC meetings and reviewed the Daily CQC Reports, Daily Production Reports, and Daily Photo documentation outlining Aptim's performance of these activities. Relevant testing data and as-built survey data were reviewed as it became available throughout construction, and the CQA Manager reviewed any RFIs, FCRs/FWV and other submittals that the Navy RPM wished input on.

The CQA Monitors were onsite for specific construction tasks related to the shoreline revetment construction; seawall construction; and piezometer, monitoring well, and leachate monitoring/extraction well construction.

5.2 Certification

Based on the observations of Innovex-ERRG Joint Venture Construction Quality Assurance team and the data presented in the appendices of this report and in the Final Remedial Action Completion Report (Aptim, 2020), the Phase II contract elements of the Parcel E-2 Remedial Action were constructed in accordance with the project specifications, the DBR, and design drawings with the revisions and deviations as stated in this report. Components of the construction monitored by Innovex-ERRG Joint Venture were completed in accordance with the project requirements as described in this report.

To the best of our knowledge, after thorough investigation, we certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment or knowing violations.

_____

Peter D. Loveridge, P.E.
C52519
CQA Manager

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FIGURES

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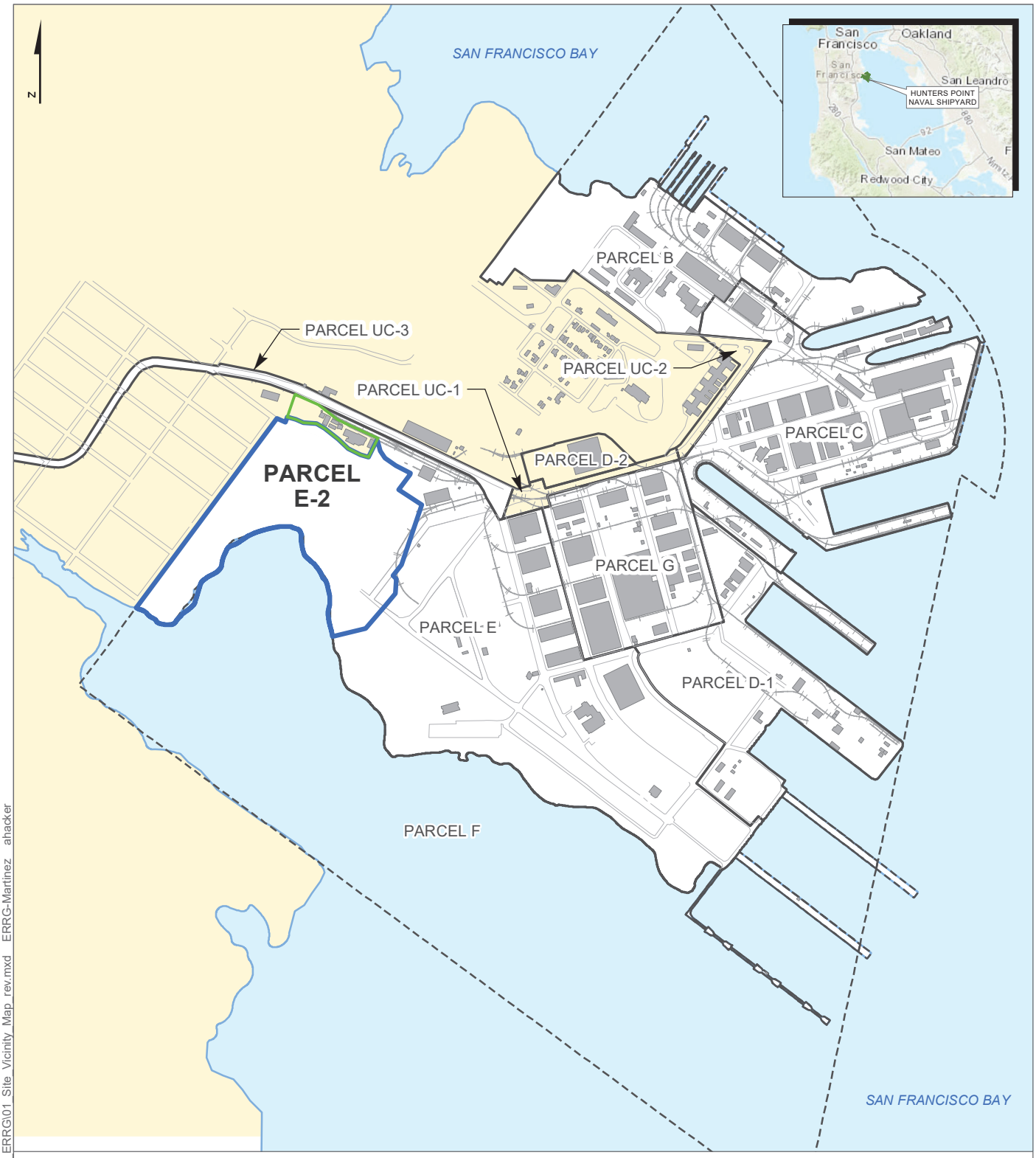

Parcel E-2 Boundary
University of California, San Francisco Facility
Other Parcel Boundary
Parcel F Boundary
Road
Rail Line
Non-Navy Property
Building

0 1,200 2,400
Feet
1 inch = 1,200 feet

NAVFAC
Naval Facilities Engineering Systems Command

Hunters Point Naval Shipyard
Department of the Navy, BRAC PMO West, San Diego, CA

FIGURE 1

SITE VICINITY MAP

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Parcel E-2

Other Parcel Boundary

810 Building (with building number)

Non-Navy Property within Parcel E-2 Landfill

Non-Navy Property

University of California, San Francisco Facility

0 360 720

Feet

1 inch = 360 feet

NAVFAC
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FIGURE 2

PARCEL E-2 AREAS

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APPENDIX A
CQA REPORTS

- ID_CQASR_App_A_1of4.pdf
- ID_CQASR_App_A_2of4.pdf
- ID_CQASR_App_A_3of4.pdf
- ID_CQASR_App_A_4of4.pdf

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